STUDY OF THE OBTAINING OF CELLULOSE FROM LIGNOCELLULOSIC MATERIALS

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Introduction. In this project the cellulose obtaining from two lignocelluloses materials are studied, the bagasse of sugar cane and the straw of maize. Both compounds have high concentrations of cellulose and are obtained in big quantities as residues of agroindustrial activities. Cellulose is within the matrix of lignin (figure 1).

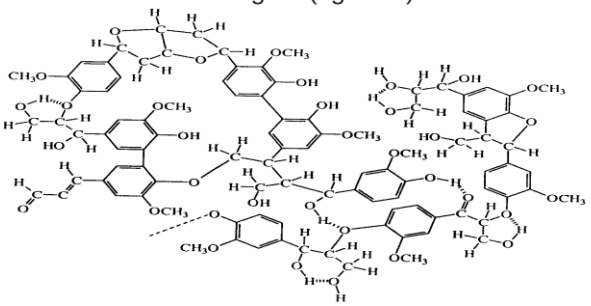

Fig.1 Structure of lignin.

Both materials were pretreated by physicochemical technic, before a microbiological degradation. The microorganism used was *Pycnoporus cinnabarinus* fungus.
The objective of this work is to analyze the lignin biodegradation in order to obtain cellulose, as a higher value added product.

Methods. Lignocelluloses materials were pretreated by a physic-chemical pretreatment, which consisted in an acid hydrolysis with H_2SO_4 (1), to improve the enzymatic hydrolysis in biodegradation.
The fungus was inoculated on a solid culture compound by: 10 g of glucose, 3 g yeast extract, 3 g malt extract, 5 g bacto tripytone, 20 g of agar. Then a liquid culture medium was prepared with: 3 g sucrose, 0.05 g $MgSO_4$*$7H_2O$ 0.50 g $MnSO_4$ * H_2O, 0.01 g $CaCl_2$, 1 ml mineral solutions, 0.50 ml vitamins solutions, to feed the bioreactor.
The lignocelulosic materials, the liquid culture medium and the biomass were placed in 1 l bioreactors to degrade lignin and to obtain cellulose. The bioreactors were feed with 10 l/min of air continuously, with about 0.276 g/l of biomass and 20 g of lignocellulos pretreated material.
Bioreactor liquid samples were taken every day.
The biomass evolution was followed by protein quantification, using the Bradford reagent method (2).
The lignin degradation evolution was analyzed by IR spectrophotometric, at 532 nm of wavelength.
Finally, the cellulose obtained by biodegradation, using the pretreatment and without using pretreatment was compared.

Results. Figure 2 shows the IR results when straw maize was analyzed after pretreatment and after pretreatment plus biodegradation.

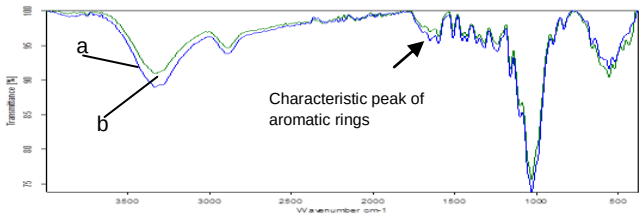

Fig.2 Comparison samples

The arrow shows the characteristic peak of aromatic groups, which exist in the lignin molecular structure. The analysis was making using this peak, the line (a) shows the results of straw maize after pretreatment and the line (b) after pretreatment plus biodegradation.
Figure 3 shows the IR results when the sample was analyzed after pretreatment and after pretreatment plus biodegradation in the peak of aromatic groups.

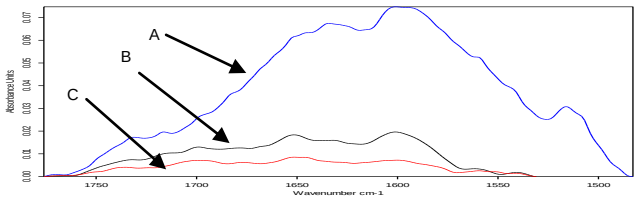

Fig. 3 characteristic peak of aromatic groups

The arrow show the material (A): straw of maize, (B): straw of maize after pretreatment, (C): straw maize after pretreatment plus biodegradation.
Figure 4 shows growth of the biomass before and after adding the raw material that was pretreatment.

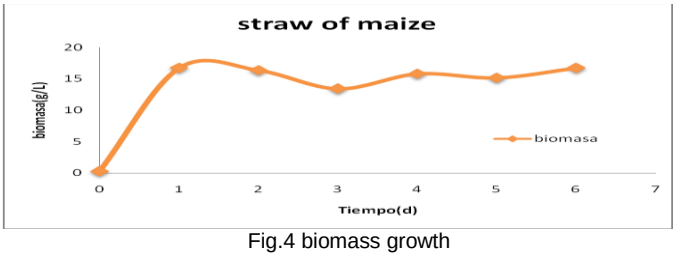

Fig.4 biomass growth

Conclusions. Lignin degradation by *Pycnoporus cinnabarinus* represents a minimum part of the lignin degradation compared with pretreatment degradation.

References.

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2. Bradford, M. (1976). Analytical Biochemistry, vol.72, p. 248-25